

REMARKS:

In the outstanding Office Action, the Examiner rejected claims 11, 12, 14, 15 and 17-23. Claims 12, 15 and 18-20 are amended herein, and claim 24 is added. Claims 1-10, 13 and 16 remain cancelled. No new matter is presented. Thus, claims 11, 12, 14, 15 and 17-24 are pending and under consideration. The rejections are traversed below.

For convenience of the Examiner, the arguments presented in the November 17, 2005 Amendment are replicated below. In addition, new claim 24 is added herein.

REJECTION UNDER 35 U.S.C. § 102(b):

Claims 11, 12, 14, 15 and 17-23 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,228,131 (Ueda).

Ueda changes the initial value of the branch history in a branch prediction table (113) as no branching is executed by applying a clearance signal (157) to reset all values and designate that "no branching is executed" (see, col. 15, lines 60-66, col. 16, lines 36-38 and FIG. 6). For example, as shown in FIG. 6, upon receipt of the clearance signal (157), all the contents of the branch history table are changed into a "direction of not branching." The branch history latch (153) then receives a branch prediction control signal (160) that is used to determine how to apply a branch prediction result (see, col. 16, lines 2-12). That is, the branch prediction control signal (160) is only applied for determining how to utilize the branch prediction result itself. Further, and due to the initialization by the clearance signal (157) in Ueda, the branch prediction table is initialized into a direction of not branching at all.

The branch history table of Ueda stores pre-specified prediction values which are all false and a desired pre-specified pattern indicates no branch prediction such that said branch prediction means predicts processing in a particular order when in said first state (see, col. 21, lines 42-62 and col. 22, lines 61-66).

Ueda, at col. 21, lines 58-62, also explicitly states, "even when context switching instruction varying the program executing condition were executed for example, branch history is automatically cleared." For example, according to Ueda, when switching occurs from process A to process B, the branch prediction table is also initialized into a direction of not branching (see also, col. 15, lines 60-66). That is, degradation of performance is caused by of Ueda's application of "initialization into a direction of not branching" to, for example, loop structures in a program.

In contrast to Ueda, the present invention applies initialization into a direction of branching for a branch instruction of returning to the top of a loop, thereby reducing the number of branch prediction mistakes. The present invention prevents branch prediction misses that may occur when a process switch occurs and a corresponding branch prediction needs to be executed.

Independent claim 12 recites that the present invention performs, "initialization of the branch prediction information by determining an initialization value according to a comparison of a program counter value with a branch destination address and a determination of whether a branch prediction direction is backward taken (BT) or forward not taken (FN)." Independent claims 15 and 18-20 also recite similar features.

Independent claims 21-23 that the present invention determines "an initialization value according to a comparison of a program counter value with a branch destination address and a determination of whether a branch prediction direction is backward taken (BT) or forward not taken (FN)" to execute the initialization.

For at least the above-mentioned reasons, claims depending from the independent claims are patentably distinguishable over Ueda. The dependent claims are also independently patentable. For example, claims 11, 14 and 17 recite that the present invention performs "initialization based on prediction information given to the branch instruction." Ueda does not teach or suggest these features of claims 11, 14 and 17 including corresponding features recited in independent claims 12, 15 and 18.

Therefore, withdrawal of the rejection is respectfully requested.

NEW CLAIM:

New claim 24 is added to recite, "setting the branch prediction to branch prediction information indicative of a branch prediction direction upon switch from a first process to a second process" and "initializing the branch prediction information based on a comparison of a program counter value with a branch destination address."

That is, the present invention includes, "selectively outputting branch prediction direction information backward taken (BT) and branch direction information forward not taken (FN)" such that "when the branch destination address is smaller than the program counter value the branch prediction direction information backward taken (BT) is output."

Ueda does not teach or suggest the above-discussed features of new claim 24.

Therefore, it is respectfully submitted that new claim 24 is patentably distinguishable over Ueda.

CONCLUSION:

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

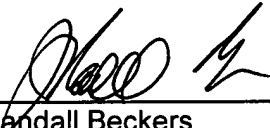
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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